

Measuring Biochemical Oxygen Demand in Crabtree Swamp in Conway, SC

Allen Ruff , & Dr. Monica Gray

Introduction

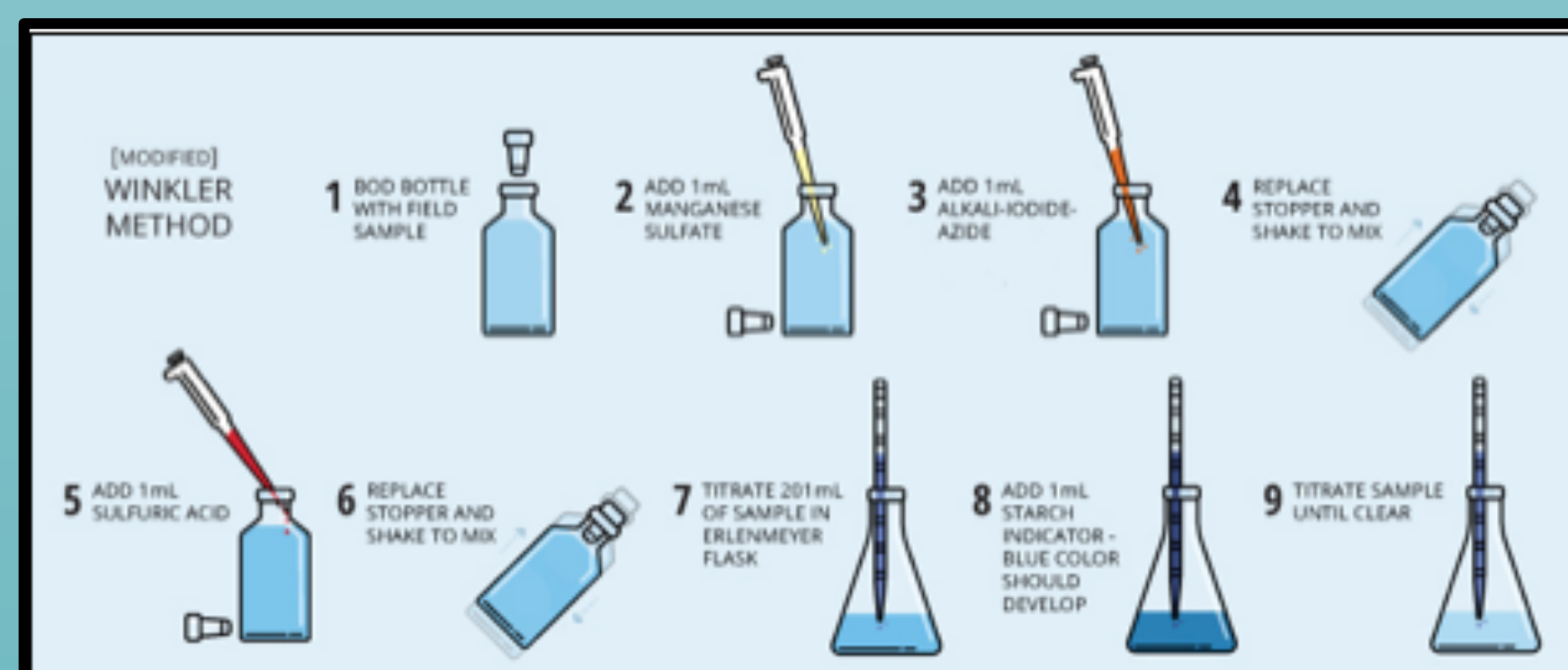
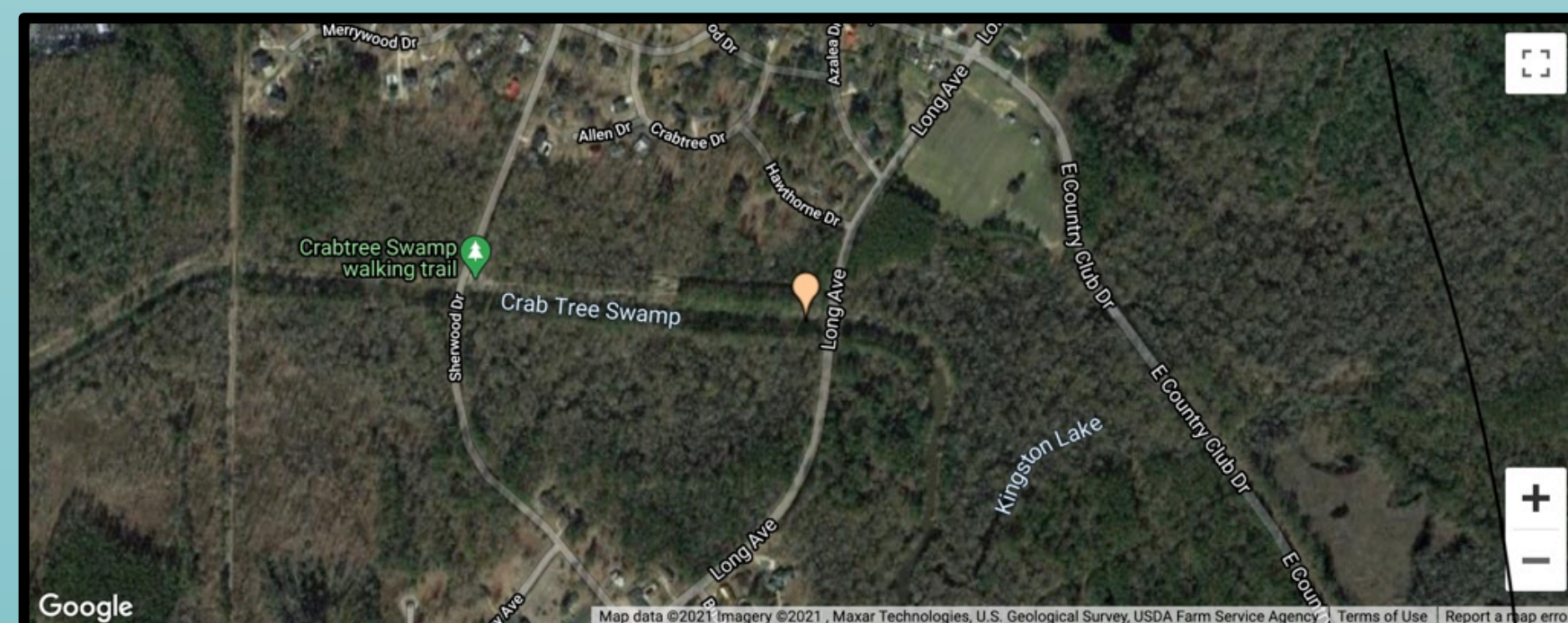
Biochemical Oxygen Demand (BOD) is the measurement of dissolved oxygen in water that is required for organisms to decompose organic matter. Biochemical Oxygen Demand is found by analyzing the dissolved oxygen in water over a period of five days (EPA, 2012). Due to the five-day period, Biochemical Oxygen Demand is most commonly referred to as BOD₅. This measurement is vital to determining the pollution levels in and health of a water body. The BOD levels will be measured in milligrams of Dissolved Oxygen per liter (mg DO/L). For the different levels anything under 1 mg DO/L is unpolluted water. A level of between 2 mg DO/L and 8 mg DO/L is moderately polluted water and anything above 8 mg DO/L is considered polluted (What Is BOD?, n.d.). In this study, BOD data obtained from the Crabtree Swamp, South Carolina over the last ten years were analyzed.

Background & Motivation

- Biochemical Oxygen Demand is the measurement of dissolved oxygen in water that is required by organisms to decompose organic matter.
- Organic matter involves matter that is composed of organic compounds.
- Two examples of organic matter are bacteria and algae.
- Biochemical Oxygen Demand levels can help determine if there is enough dissolved oxygen for oxygen demanding species to feast on.
- Elevated Biochemical Oxygen Demand levels indicate that there is more oxygen that will be needed in the ecosystem.
- Decreased Biochemical Oxygen Demand levels indicate that less oxygen is being removed from the water. This will result in more pure water.

Methods and Motivations

- Between January 31, 2008 and February 18, 2021, three hundred fifty samples were collected at Crabtree Swamp located in Conway, SC between Sherwood Dr. and Long Ave.
- The process of measuring the water's BOD level is called the Winkler Method which involves
 - Getting a sample of water
 - Using reagents to form an acid compound that is titrated
 - The change of water will determine the Biochemical Oxygen Demand level



Results and Discussion

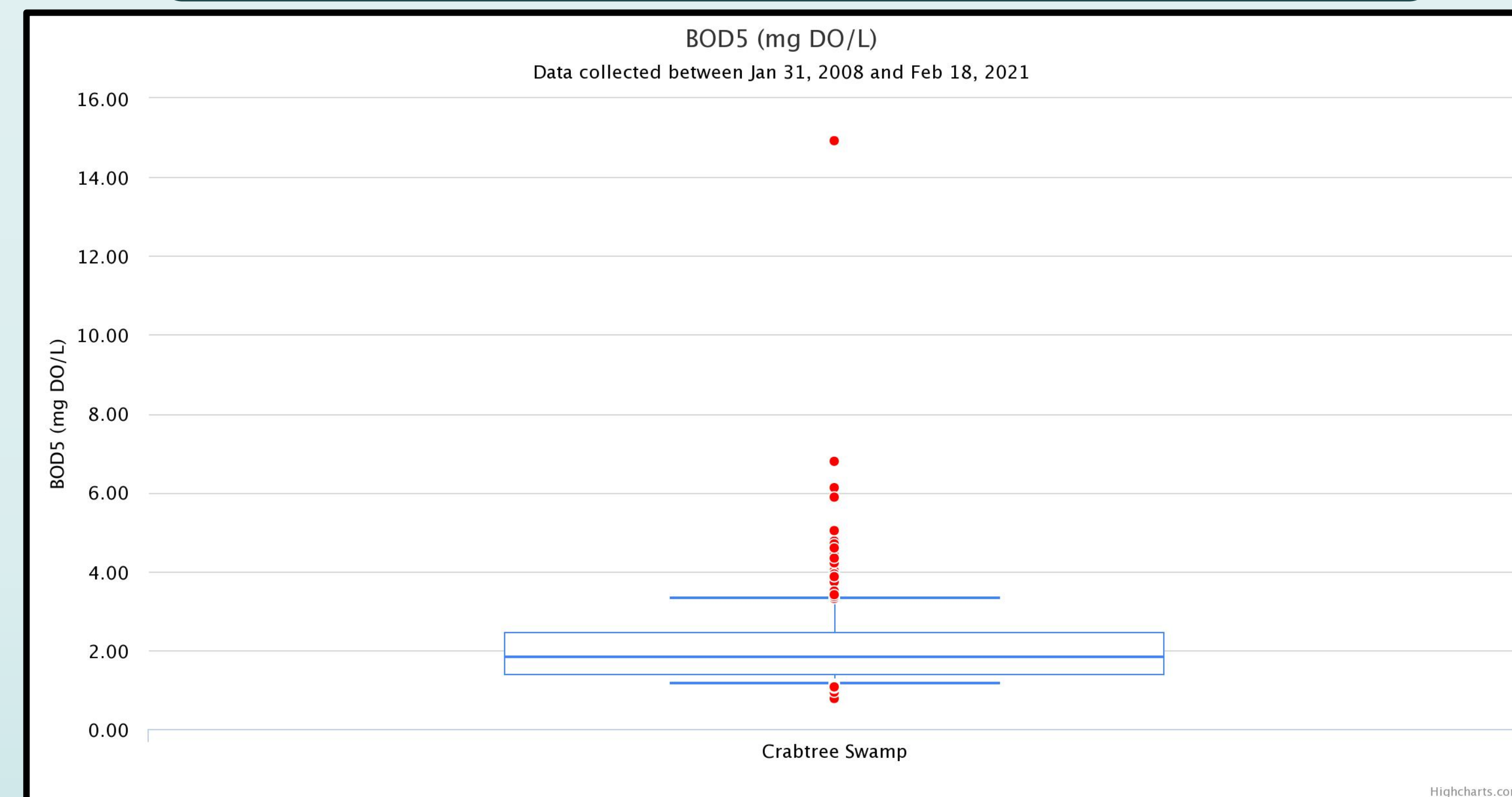


Figure 1: Box plot of the BOD levels measured in Crabtree Swamp.

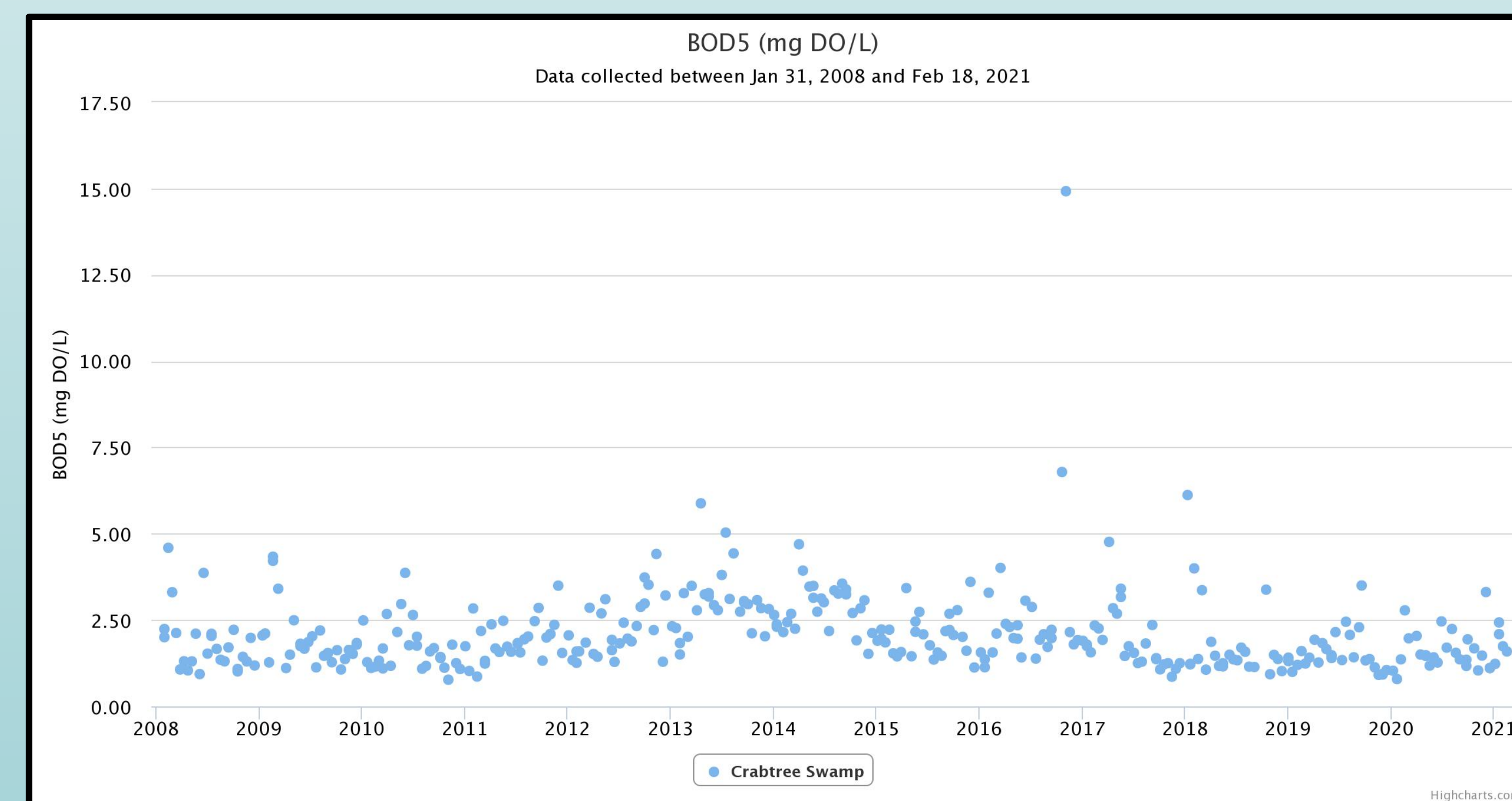


Figure 2: Dot plot of the time trend. Each blue dot represents a sample

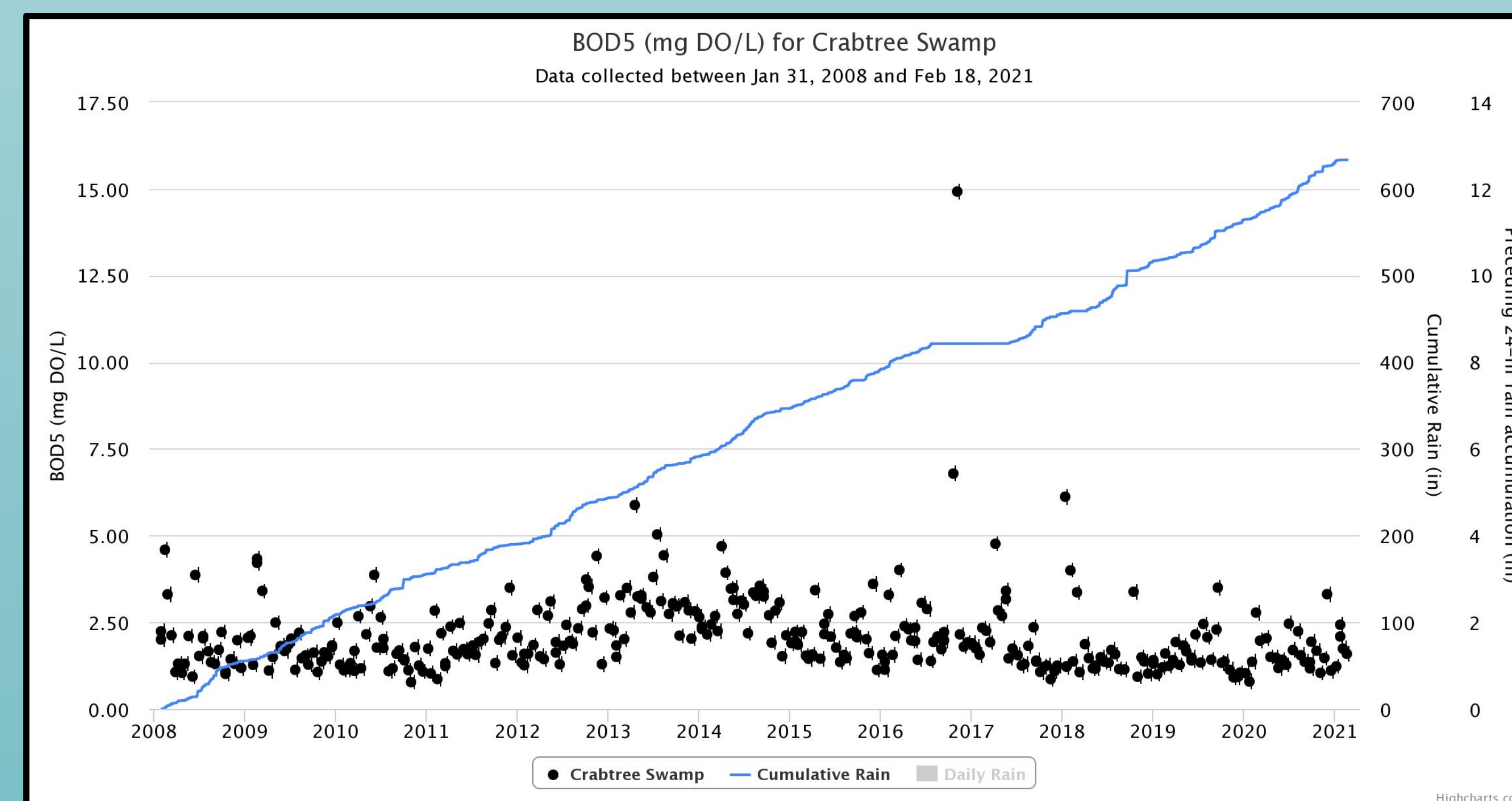


Figure 3: Time trend of BOD compared to the amount of rain. Blue line being rain and black dots being the samples

# of Samples	Mean	S.D.	Median	Max	Min	10th	25th	75th	90th
350	2.09	1.14	1.83	14.92	0.77	1.14	1.37	2.46	3.31

Figure 4: Data Collected from Crabtree Swamp

Conclusions

- Throughout the years, the Biochemical Oxygen Demand levels have stayed at a moderately polluted level and have been going down throughout the years.
- There were two major outliers being a max of 14.92 and a minimum of 0.77 which shows the wide range of BOD levels in the swamp.
- While it appears that the levels of BOD have been slowly decreasing throughout the years, there is more that can be done to help protect the ecosystem in the swamp.
- From protecting the swamp from runoff to filtering the runoff before it reaches the swamp.

Acknowledgment

I would like to begin by thanking Dr. Gray from Coastal Carolina University who assisted in the implementation of this study and helped edit and review this paper. I would also like to thank the Waccamaw Watershed Academy for assisting in the gathering of data for this paper. Finally, I would like to thank the staff at the Coastal Carolina University writing center for revising this paper.

Reference

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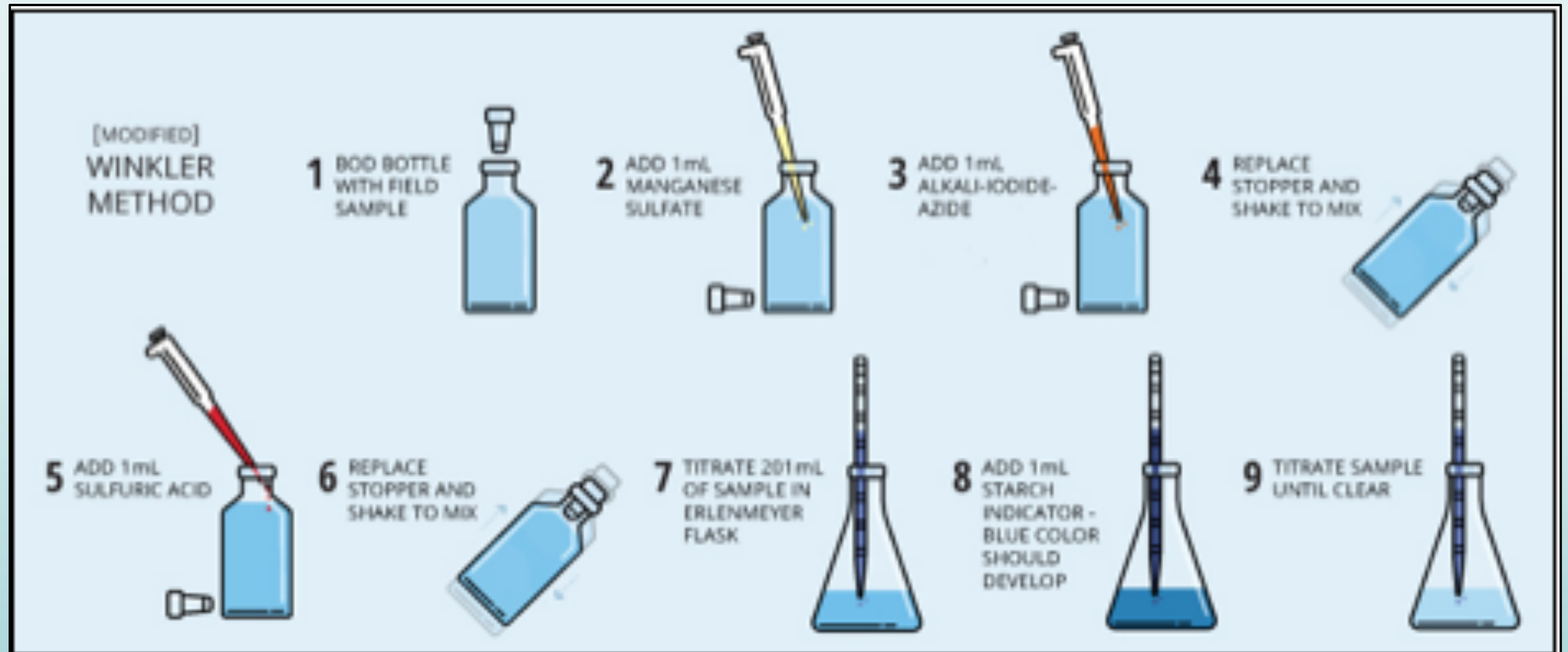
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Results and Discussion

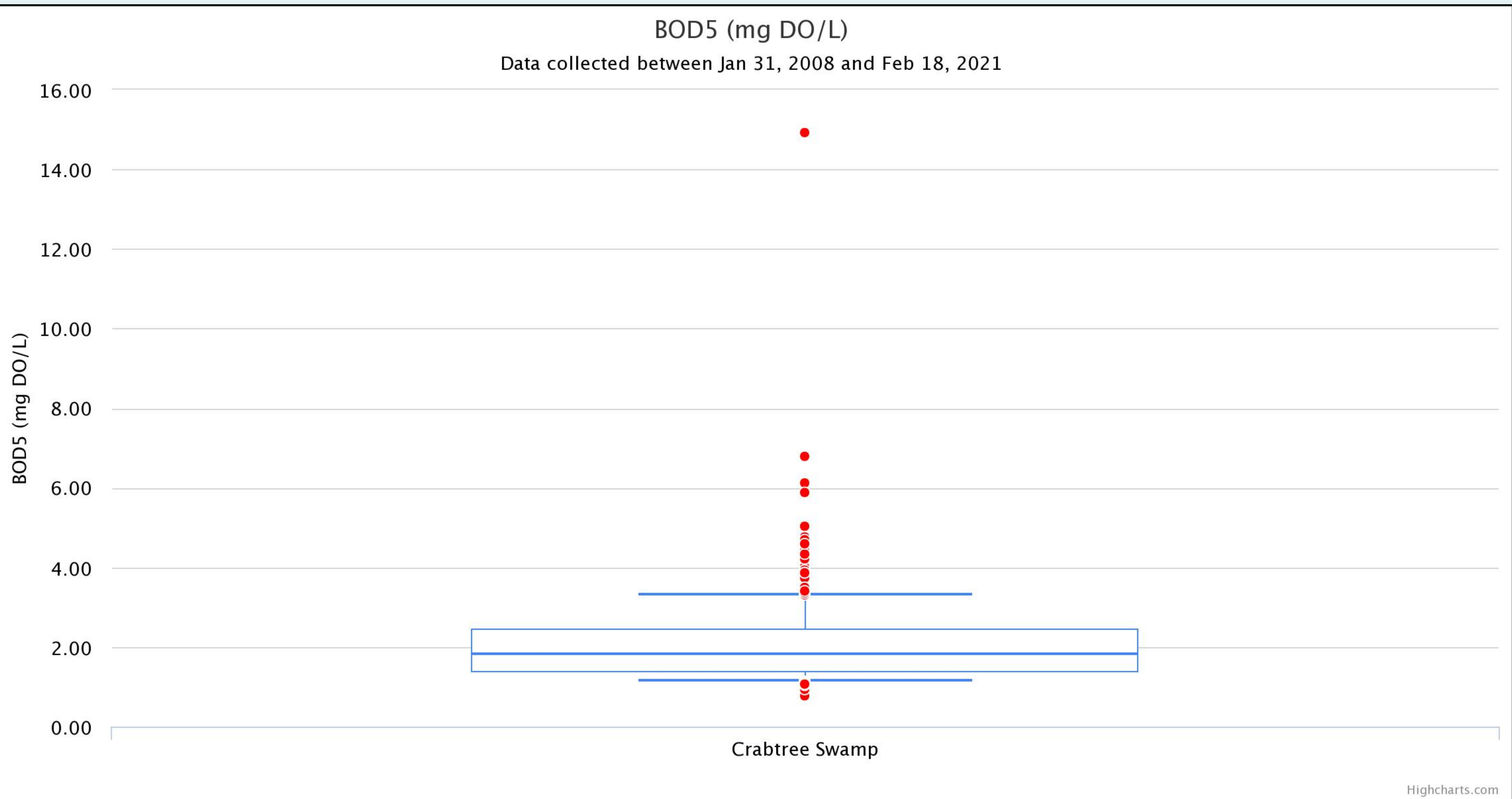


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Results and Discussion

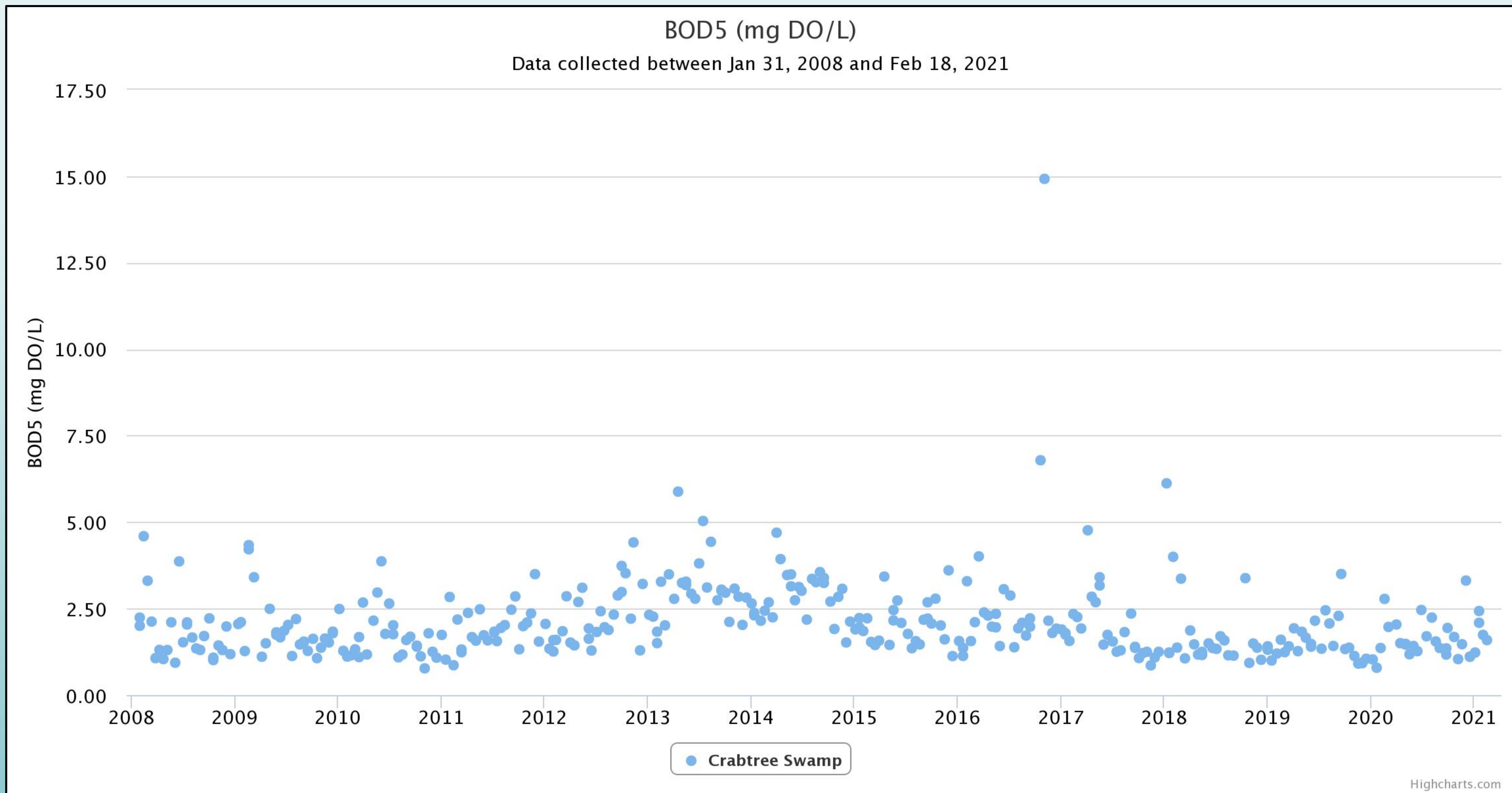


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Results and Discussion

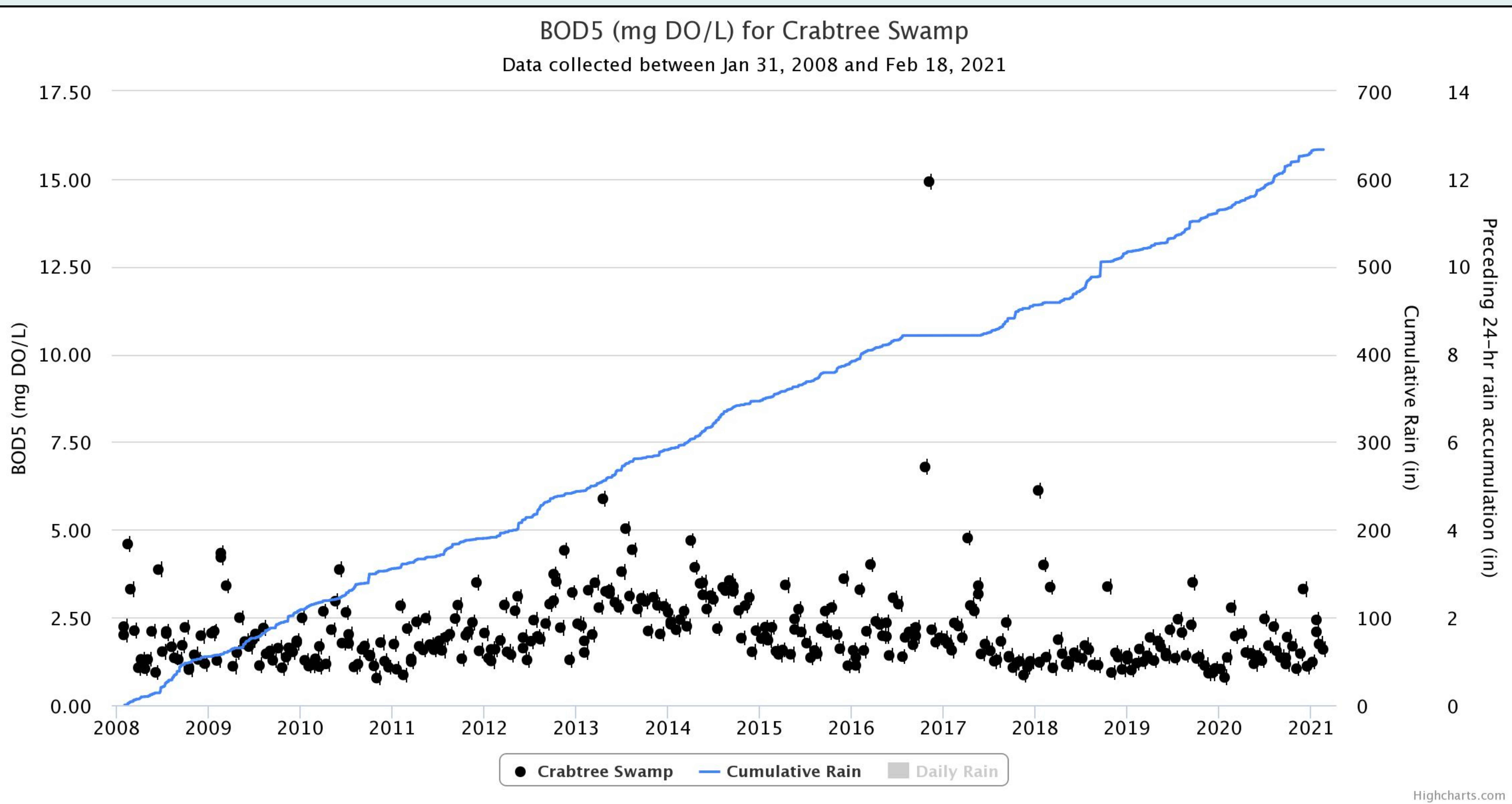


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